

REMARKS

Favorable and prompt allowance of the pending claims in the application is respectfully requested on the basis of the following particulars.

1. In the claims

In the Amendment to the Claims, claims 1-22 are cancelled without prejudice or disclaimer. New claims 23-44 are provided in place of claims 1-22.

a. New claims

New claims 23-44 relate to claims 1-22 in the following claim concordance chart.

Claim Concordance Chart	
New Claim	Original Claims
23	1, 5 and 9
24	6
25	7
26	8
27	10
28	1, 5 and 6
29	11
30	1 and 11
31	3
32	4
33	14
34	Specification at page, 5, lines 14-17 and

	page 10, lines 11-17
35	15
36	16
37	17
38	18
39	13
40	19
41	20
42	21
43	22
44	22

It is submitted that the new claims comply with U.S. rules, including 35 U.S.C. § 112, and no new matter is included by way of the claims. Entry of new claims 23-44 is respectfully requested in the next Office communication.

b. Rejection of claims under 35 U.S.C. § 112, second paragraph

As for the rejection of the claims under 35 U.S.C. § 112, second paragraph, the language of original claim 2 is not represented in the new claims, and the term “substantially” is not used in the new claims.

Regarding the objection raised in point (5) of the action, it is submitted that the term “infinite” is indeed clear. New claim 37 (which relates to original claim 15) recites the term “infinite.”

It will be pointed out that claim 37 does not state that the stiffness of the outer turn portion is infinite. The use of the term "infinite" is made clear in view of the description provided in new claim 36, and the description in the specification.

The angles delta1 and delta2 are selected so that the deformation of the turn portion delimited by the angles delta1 and delta2 is substantially the same as the deformation which would occur if the thickness of the strip located between the angles delta1 and beta1, and between the angles beta2 and delta2 were the same as the remainder of the hairspring and if, between the angles beta1 and beta2, the stiffness of the outer turn would be infinite.

A detailed explanation of the calculation of delta1 and delta2 is provided in the specification at page 11, line 21 to page 13, line 5.

Accordingly, the use of the term "infinite" is sufficiently definite, as made evident by the context by which it is used in both the claims and the specification. Withdrawal of the rejection of the use of the term "infinite" is respectfully requested.

2. In the drawings

Replacement sheets for Figs. 2-4 are submitted herewith which identify drawings of these figures as being "Prior Art." These sheets are submitted to replace all prior versions of Figs. 2-4.

Entry of these drawing changes is respectfully requested in the next Office communication.

3. Rejection of claim 13 under 35 U.S.C. § 102(b) as being anticipated by U.S. patent 3,528,237 (Suard)

Rejection of claims 1, 4-10 and 13-21 under 35 U.S.C. § 102(b) as being anticipated by Swiss patent 327796 (Michel)

Rejection of claims 2, 11, 12 and 22 under 35 U.S.C. § 103(a) as being unpatentable over Swiss patent 327796 (Michel)

Reconsideration of the rejections of the claims in view of the prior art is respectfully requested in view of the new claims, and the following observations of the new claims in view of the prior art.

a. Claims 23-27

Claim 23 particularly requires that the extra thickness defined by the stiffened portion relative to the remainder of the strip is situated exclusively on the outer side of the outer turn. Contrary to the assertion in the action at section (17), this feature of the plane hairspring is neither disclosed nor suggested by *Michel*.

Michel does not disclose a stiffened portion having an extra thickness of which is situated exclusively on the outer side of the outer turn. It will be pointed out that Figs. 4-7 in *Michel* are actually cross-sectional views taken along line D-D in Fig. 1 which resemble cross-sectional views of the stiffened bent portion AB (beta). The radial position of the stiffened portion AB relative to the remainder of the strip forming the hairspring is not shown in Figs. 4-7 and is not specified in the description.

In observing Michel, one having skill in the art would readily recognize that the stiffened portion AB in Michel protrudes radially both outwards and inwards relative to the remainder of the strip forming the hairspring.

Included herewith is appendix A which shows exemplary drawings demonstrating the bending of a strip with a conventional bending machine. It is readily evident from Figs. B and C that bending of the strip causes the strip to protrude to both sides of its original shape, as depicted by the dashed lines.

In all of the embodiments of *Michel* where the radial position of the stiffened portion relative to the remainder of the strip is apparent (Figs. 2 and 8-11), as well as in Fig. 1 which appears to cover all embodiments, the stiffened portion is clearly shown to protrude radially both outwards and inwards.

It will be pointed out that the feature that the extra thickness defined by the stiffened portion relative to the remainder of the strip is situated exclusively on the

outer side of the outer turn avoids that the last-but-one turn comes into contact with the last turn, as explained on page 5, lines 27-32. This is a substantial advantage which is provided by the plane hairspring of claim 23, and is thus considered an advantage which is clearly not provided by *Michel* or any other prior art document.

In view of these observations, it is submitted that *Michel* does not disclose the features of claim 23, and that claim 23 is patentable over the prior art. Claims 24-27 are likewise patentable over *Michel* based on their dependency from claim 23 and their individually recited features.

b. Claims 28-32

Claim 28 particularly requires that the thickness of the stiffened portion in the plane of the hairspring varies over the entire length of the stiffened portion as a convex and continuous function and presents a minimum substantially equal to the thickness of the remainder of the strip at the two ends of the stiffened portion and a maximum that is greater than the thickness of the remainder of the strip between the ends.

Michel neither discloses nor suggests the aforementioned features of claim 28. Specifically, in response to section (14) of the action, the examiner refers to Figs. 6 and 7 of *Michel*. It will be pointed out, however, that these figures show the cross-section of the stiffened portion AB. As required in claim 28, the thickness of the stiffened portion varies as a convex and continuous function in the plane of the hairspring. This is clearly not described by *Michel* where in the plane of the hairspring (plane of figure 1) the stiffened portion AB has a constant thickness.

The prior art, including *Michel*, does not disclose or suggest a stiffened portion of an outer turn of a hairspring wherein the thickness varies as a convex or continuous function in the plane of the hairspring. This feature is advantageous in that it reduces the risk of the hairspring breaking during fabrication or in operation (see specification at page 11, lines 13-20).

In view of these observations, it is submitted that claim 28, and claims 29-32 which depend from claim 28, are patentable since *Michel* and the prior art fail to disclose all of the features required by these claims of the pending application.

c. Claims 33-44

In turning to claims 33 and 36, from which the remaining claims depend, each of these claims pertains to a method for designing a plane hairspring. Specifically, each claim is directed to a method for precisely determining which portion of the outer turn is to be stiffened to obtain a plane hairspring that deforms concentrically.

According to the prior art, the position and angular extent of the stiffened portion are determined entirely empirically and, therefore, cannot be as accurate as in the pending application.

In the method of claims 11 and 14, the unbalance of a hairspring of constant strip thickness is calculated, a portion of the outer turn of the hairspring having the same unbalance as the hairspring is calculated, and the outer turn portion is stiffened. The specification provides a detailed description of how these calculations are made (pages 9-11). It is submitted that the prior art does not disclose or suggest that, in order for the deformations of the final hairspring to be concentric, the outer turn portion to be stiffened should have the same unbalance as the initial hairspring as a whole.

In reference to the action at section (20), it is understood from *Michel* that the cited passages at page 1, lines 1-3 and 7-15 do not disclose that the unbalance of an initial hairspring of constant strip thickness is calculated and that a portion of the outer turn of the hairspring having the same unbalance as the hairspring is calculated.

Indeed, it is understood from page 1, lines 1-3 of *Michel* that the object of *Michel* is to provide a flat hairspring, which may be used in horology, for example. Moreover, it is understood from page 1, lines 4-15 of *Michel* that in a portable watch, especially in a wrist-watch, a flat hairspring (*Archimedes*) is preferably used, which

however has the drawback of eccentric development, which causes an unbalance of the regulating part and particularly exerts a lateral pressure on the pivots of the balance, which pressure disturbs the operation and wears the components. *Michel* further appears to explain that the eccentricity of the hairspring is caused, in large part, by the development of the outer turn and the inner turn.

In further observing Fig. 1 of *Michel*, the examiner points to beta. However, the description of *Michel* does not indicate how beta is determined. In fact, as mentioned above, it is clear that beta (i.e., the portion AB) is determined empirically. *Michel* does not propose a criterion for determining theoretically and precisely which portion of the outer turn is to be stiffened. On the contrary, *Michel* proposes a very broad range of values for the angle beta (see claim 10, for example, which indicates between 70 and 180 degrees).

In view of these observations, it is submitted that claims 33 and 36, and the claims dependent therefrom, are patentable of *Michel* and the rest of the prior art. Accordingly, allowance of claims 33-44 is respectfully requested.

4. Conclusion

As a result of the new claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicant's attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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Date: July 25, 2007

Respectfully submitted,



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